EWN Engineering With Nature®

Nutrient Dynamics of the Beneficial Use of Dredged Sediment

Background

Carbon (C) cycling provides the foundation for all ecological functions in both natural and engineered systems (including wetlands), and C dynamics are of increasing interest globally. While studies have shown that C characteristics and fate differ between natural and built environments, few studies quantify C accumulation and quality in created or restored systems. In particular, studies have not evaluated mineral-complexed carbon in wetlands, despite this carbon pool representing a long-term mechanism for storing C. Evaluating C dynamics improves our capacity to design and build better projects under EWN.

Objectives

No studies of C dynamics have specifically been integrated with the EWN Initiative framework. We will address this data gap to increase our capacity to design and manage EWN projects for maximal nutrient and C-cycling benefits. Because dredged sediment contains a higher abundance of mineral sediments than most coastal zone soils, EWN features utilizing dredged sediment may represent ideal locations for C mineralization and long-term storage. Demonstrating this will assist in justifying future EWN initiatives within a C dynamics context and will support further integration of C accounting across DoD projects and installations.

Approach and Outcomes

Sample locations will include areas in Florida, Mobile Bay, San Francisco Bay, Chesapeake Bay, and the Great Lakes. We will use novel carbon fractionation, aggregation, and characterization techniques to investigate stable, mineralized C storage. This will include a new acid-washing approach that has never been applied to wetland systems.

Results can be used to (1) determine the "value" of C storage in EWN projects and (2) inform the design of future projects to optimize long-term C storage.